



Road & Bridge Design Publications

Monthly Update – August 2014

Revisions for the month of **August** are listed and displayed below. The special detail index from **June** will remain in effect. Contact Wayne Pikka (pikkaw@michigan.gov) for questions related to these changes.

Road Design Manual

1.02.05C: Notes, Charts, Legends, & Conventions: The last paragraph was modified slightly for clarification.

2.05.04: Showing SESC Measures on Plans: An outdated bullet regarding the use of an SESC block on plan sheets was eliminated in favor of one with the current procedure, with a reference to the Road Sample Plans.

7.01.30B: Guardrail Location in Fill Sections (New Construction): Sketches were revised to only include information necessary to properly locate guardrail.

7.06.03C: High Tensile Eight Wire Fence: The first sentence was revised to exclude the “experimental” status of the fence.

13.05.07: Erosion Control Items: This section was deleted since it is better related to and covered in more detail in Chapter 2 and the quantities are no longer included under the miscellaneous estimate on the note sheet

14.07.01: Project Work Type Codes and Descriptions: Corrected a misspelling in the description of work type code 113, Cantilevers/Trusses.

Updates to MDOT Cell Library, Bridge Auto Draw Program, etc., may be required in tandem with some of this month's updates. Until such updates to automated tools can be made, it is the designer's/detailer's responsibility to manually incorporate any necessary revisions to notes and plan details to reflect these revisions.

MICHIGAN DESIGN MANUAL

ROAD DESIGN

1.02.05 (revised 8-18-2014)

Typical Cross Sections

Typical cross sections are included in plans to give a graphic display of the existing and proposed cross sections of the roadway. They also describe to the contractor where each typical section will apply. All integral parts of the roadway and the roadbed should be shown including: subbase, base, surfacing, shoulders, slopes, medians, barriers, curbs, gutters, ditches, sidewalks, and so forth.

A. Stationing

Only the alignment required to construct the project should be shown. Stationing should be continuous with no overlaps or gaps. Stationing for superelevated sections should include the superelevation transitions. Each different condition that cannot readily be shown on one typical section should have its own section. Stationing, where that section applies, should be shown under the section. An overall Right of Way dimension shall be included. The designer should ensure that the entire project has an appropriate typical cross section.

B. Scale

Typical cross sections should be drawn to a scale that will allow the typical to fill the width of the page. Show the scale (horizontal and vertical) in the title block.

For horizontal dimensions, use decimals, not feet and inches (only for fractional dimensions, example 12' not 12.00'; 2.5' not 2'-6"; 2.67' not 2'-8"). Vertical dimensions are typically in inches (example 18" not 1'-6" or 1.5').

1.02.05 (continued)

C. Notes, Charts, Legends, & Conventions

Typical section notes should be placed on the lower right corner of the first typical cross section sheet.

The HMA application chart shall be shown on the first typical cross section sheet which has an HMA section. This chart shall include: the HMA mix, the rate of application, the performance grade, and remarks.

All concrete typical sections should indicate the location of longitudinal joints required as detailed in the Road Sample Plans.

D. Existing Typical Cross Section

Often, a separate existing typical cross section is needed to show the existing conditions and removals.

When the existing conditions are incorporated into the proposed cross section, they should be shown with dashed lines.

Typical sections should show pavement and shoulder slopes and grading or subbase slopes. Also, show existing and proposed crown point location.

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2.05.03 (10-20-2008)

Hydraulic Design Considerations

While many of the SESC measures typically included on plans require no formal hydraulic design, there are others that call for input from hydraulics, materials, or construction experts across the Department. Hydraulic design considerations are discussed in Chapter 9 of the Drainage Manual and may involve:

- Sizing or spacing for improved effectiveness
- Materials selection
- Dual-use temporary and permanent storm water management

2.05.04 (revised 8-18-2014)

Showing SESC Measures on Plans

Standard Plan R-96-Series shows standard SESC measures and their intended use. They are indicated on the plans by a legend at the location they are to be used. This legend must correspond to Standard Plan R-96-Series, which in turn corresponds to the individual E&S detail sheets in the SESC Manual.

Not all E&S measures are contract items (pay items) in and of themselves. Standard pay items may be required to complete the construction of the E&S measure as is the case with Diversion Dike (E&S-10) where the diversion dike is constructed using the pay item Embankment. Conversely, the E&S measure may require the omission of work as is the case with Vegetative Buffer at Watercourse (E&S-22), which calls for retaining vegetation adjacent to a watercourse.

2.05.04 (continued)

Many of the E&S measures include optional work that may be included to increase the effectiveness of the measure or to address a specific site condition. The optional work often includes the addition of a sediment trap, check dam or silt fence. Since the need for the optional measures is not known at the time of design, these items of work are often included as miscellaneous quantities on the plans. The designer should always refer to the information on the E&S Detail sheets when placing E&S measures on the plans.

The success of the SESC measures selected during design depends in part on the ability of the contractor to translate the measures indicated by key numbers and notes on the plans to the most effective location and placement in the field. Suggestions on how best to accomplish this include:

- Show inlet protection, sediment traps, and check dams on the profile sheets to more clearly indicate location.
- Include control measures for use during the mobilization, clearing and removal process.
- Call for SESC measures at the break point of ditches.
- Call for intermediate measures within the construction area not just at the right-of-way line or at the edge of sensitive areas.
- Call for silt fence where it will function as intended - not at the top of backslope.
- Call for silt fence in all four quadrants of cross culvert outlets.
- Include miscellaneous quantities of the pay items such as the following for use as needed:
 - Temporary Seed
 - Silt Fence
 - Gravel Access Approach
 - Sediment Trap
 - Check Dam
 - Inlet Protection

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2.05.04 (continued)

Showing SESC Measures on Plans

- Identify erosion control measures on the construction sheet with the 'Erosion Control Number' cell. Pay for erosion control items in the main list of 'Quantities This Sheet'. Do not show key number next to pay item. See Road Sample Plans.
- Include plan notes to indicate required sequence of placement of SESC measures to maximize their effectiveness.
- Include an adequate quantity of the pay item Erosion Control, Maintenance, Sediment Removal.
- Use special provisions for non-standard SESC measures when necessary and show these measures on the plans.
- Clearly identify sensitive areas such as lakes, streams, or wetlands, and include Vegetated Buffer at Watercourse (E&S-22);
- Delineate areas that are not to be used for materials or equipment storage and call for these areas to be clearly identified in the field.
- Clearly identify critical areas such as highly erosive soils or slopes.
- Show key numbers for E&S Details that do not have pay items associated with them such as Slope Roughening and Scarification (E&S-32), when these measures are critical for successful control of erosion and sediment control.

2.05.05 (revised 9-17-2012)

Turf Establishment

For all projects requiring turf establishment contact the Roadside Development Unit of the Design Division for procedures and materials recommendations four weeks before they are needed.

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7.01.30 (revised 8-18-2014)

Guardrail at Embankments

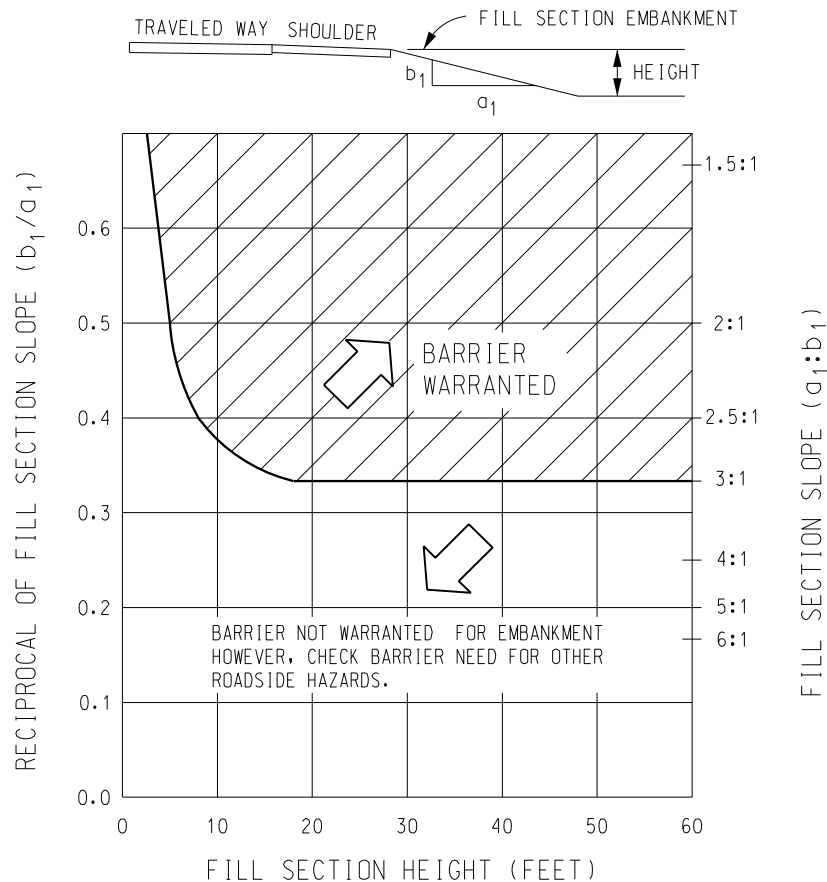
As a general rule, a barrier should be placed to protect a vehicle from going down an embankment only if the barrier itself is the least severe of the two features. Such a comparison must of necessity be very subjective because of the many variables involved. The Department generally follows the criterion that, if the fill slope is 1:3 or flatter, no barrier is required. For slopes of 1:3 or flatter, the height of fill does not increase severity.

7.01.30 (continued)

The economics of earthwork obviously dictate that all slopes cannot be 1:6, regardless of fill height. As the fill becomes higher, more consideration must be given to steepening the slopes, which in turn may call for a decision relative to placing a barrier.

Slopes intended to be traversable, i.e., one flat enough that a barrier can be omitted but still perhaps 1:3, should be relatively free of discontinuities that might "trip up" a vehicle. Plans should note that half-buried boulders and large rocks should be removed as part of the final trimming operation.

A. Height-Slope Guidelines



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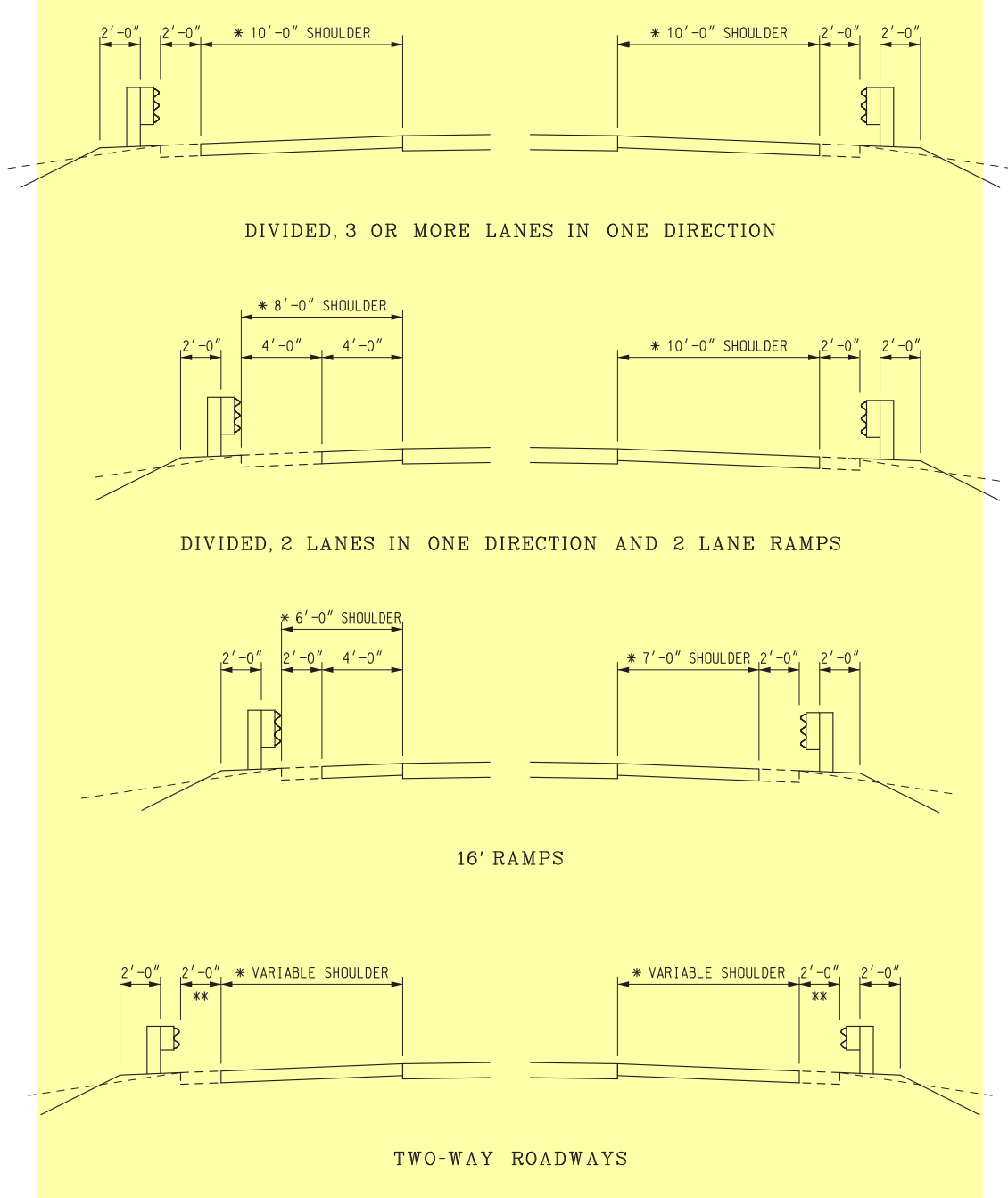
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7.01.30 (continued)

Guardrail at Embankments

B. Location on Fill Sections (New Construction)

The following shoulder sections with guardrail are shown to clarify and standardize the location of guardrail. Divided highway sections illustrate guardrail on left and right shoulders of each roadway.



* See [Section 6.05.04D](#) for paved shoulder widening at guardrail sections.

** The 2' offset from face of guardrail to edge of shoulder should not be used if the paved shoulder width is at least 12'.

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7.06

FENCING

7.06.01

References

- A. Standard Plan R-97-Series, High Tensile Eight Wire Fence
- B. Standard Plan R-98-Series, Chain Link Fence (Using Tension Wire)
- C. Standard Plan R-101-Series, Woven Wire Fence
- D. Standard Plan R-102-Series, Installation of Woven Wire Fence (At Structures)
- E. ***An Informational Guide on Fencing Controlled Access Highways***, AASHTO, October 1967. (This is the latest edition published.)
- F. Construction Manual, MDOT, Section 6.21

7.06.02

Purpose of Fence

Reference "E", above, states, "Fencing along a highway is a means of preventing unwanted and likely hazardous intrusion of animals, people, vehicles, machines, etc., from outside the right-of-way line into the vicinity of moving traffic." In the early days of the development of our highway system it was considered the responsibility of the abutting property owner to keep livestock within bounds. If someone's horse got out on the road and was hit, it was the owner's fault and owner's loss. Today, with higher vehicle speeds and controlled access operation, the driver has the expectation that the road will be clear of roadside interference. It therefore has become increasingly the highway agency's responsibility to safeguard against unwarranted intrusion on the highway.

7.06.02 (continued)

Only controlled access highways are routinely and continuously fenced. Exceptions, on such highways, are where it can be definitely established that a fence is not necessary, such as in areas of precipitous slopes or natural barriers.

7.06.03 (revised 8-18-2014)

Types of Fence

The following types of fence are used for the applications indicated:

A. Woven Wire Fence

Woven wire fence, nominally about 4'-0" high, is the predominant fence used in rural areas. Steel posts are used, unless the fence is in swampy soil, in which case wood posts are used. The type of post, whether wood or steel, must be indicated in the pay item, which means that the designer must estimate where swampy soils will be encountered along the R.O.W. line. Normally, steel posts are less expensive than wood, so a contractor will want to use steel if possible. There have been cases where the contractor has asked to use wood posts throughout a project, and this has been allowed.

B. Chain Link Fence

Chain link fence is predominantly used in urban areas. Sometimes a project will require both woven wire and chain link fence, if the character of the adjacent development is both rural and urban. If this is the case, the change over point should be selected at a convenient location at or near the end of the urbanized section and not necessarily at the city limits.

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7.06.03 (continued)

Types of Fence

C. High Tensile Eight Wire Fence

High Tensile Eight Wire Fence, as a right-of-way fence, is a substitute for woven wire fence. It is thought to be more economical to construct because it consists of individual strands of wire and has no vertical tie wires. It is considered to be more economical to maintain because a broken wire can be spliced with a patented device and re-tensioned, an obvious advantage when compared with the rehabilitation of a broken down or cut woven wire fence. Designers should consult with the Region/TSC and determine at the time of the plan review meeting whether high tensile eight wire fence should be used.

7.06.04

Location of Fence

Fence is ordinarily constructed 1'-0" inside the R.O.W. line. This is in accordance with an old common law custom that the owner of the fence should be able to theoretically construct and maintain it without setting foot on the neighbor's property.

On urban freeways, where fence is used between the freeway and the parallel service road, the location of the "R.O.W. line" between the two is often undefined. Usually, the fence will be placed at a determined distance from the inside service road curb, which may be as little as 3' to as much as 20' to 25'. The wider margin allows greater flexibility for landscaping and plantings, but the municipality must be willing to accept the greater maintenance responsibility. The fence should not be set back at a greater distance if the reason for doing so is to justify paving the area. See details of a typical fence installation between a service road and urban freeway in [Section 12.01.05](#).

7.06.04 (continued)

In rural areas, the R.O.W. line will often coincide with a quarter or section line, which also may have formerly been a property boundary when the area was farmed. These old fence lines frequently became a depository for stone piles and/or were allowed to grow into a tree line. The question of whether to remove the trees and stone piles, or to place the fence inside the R.O.W. line to avoid the costly removal, has been faced repeatedly over the years. Department practice is, if at all possible, to remove the debris and vegetation sufficient to place the fence 1'-0" inside the R.O.W. line. However, it must be remembered that a fencing contractor is not equipped, nor does the contractor have the personnel, to do extensive clearing. While clearing of the line is included in the price paid for fencing, it is customary to allow the fence to veer around a large tree to avoid having to remove it.

When chain link fence is used on urban freeways, the gapping out for ramps and the fence overlap should be accomplished as shown on the next page.

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CHAPTER 13 MISCELLANEOUS PAY ITEMS (continued)

- 13.04.03 Removing Culverts and Sewers
 - A. Removing Pipe Culverts
 - B. Removing Culverts Other Than Pipe
 - C. Removing Culvert Ends
 - D. Removing Sewers
 - E. Salvaging Culvert End Sections
- 13.04.04 Removing Miscellaneous Structures & Materials
 - A. Pay Items
 - B. Removing Pavement
 - C. Removing Drainage Structures

13.05 OTHER COMMONLY USED MISCELLANEOUS ITEMS

- 13.05.01 Obliterating Roadway
- 13.05.02 Project Cleanup
- 13.05.03 Field Offices and Laboratories
- 13.05.04 Transporting Salvaged MDOT Material
- 13.05.05 Mobilization
- 13.05.06 Escalator Clauses - Fuel, Asphalt, Cement, and Steel
- 13.05.07 Section deleted

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13.05.07

Section deleted.

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14.07.01 (revised 8-18-2014)

Work Type Codes and Descriptions

Each project is assigned a three digit work type code during the Region Call-for-Projects process. The numbers correspond to the work descriptions listed below:

Preserve

Traffic Operations

- 110 Signing Replacement
- 111 Pavement Marking
- 112 Traffic Signals
- 113 Cantilevers/Trusses
- 114 Sign Replacement

Safety

- 119 Attenuators
- 120 Intersection Revisions
- 121 Lighting
- 122 Median Barriers
- 123 Guard Rails and Attenuators
- 124 Railroad Crossing Improvements and Safety Devices
- 125 Pedestrian Screening on Structures
- 126 Obstacle Removal
- 127 Culvert Extensions
- 128 Safety Upgrading-Slope Flattening
- 129 Widening for Accident Reduction

14.07.01 (continued)

Bridge Rehabilitation

- 130 Deck Replacement
- 131 Overlay
- 132 Railing Replacement
- 133 Painting
- 134 Underwater Repairs
- 135 Widening-Maintain Same # of Lanes
- 136 Pins and Hangers
- 137 Superstructure Replacement
- 138 Bridge Reconstruction-No Added Lanes
- 139 Miscellaneous Rehabilitation
- 140 Resurfacing
- 141 Resurfacing and Hot Mix Asphalt Shoulders
- 142 Resurface-Mill and/or Pulverize
- 143 Resurface and Minor Widening
- 144 Resurface and Non-Motorized Shoulders
- 145 Resurface, Mill and Pulverize and Minor Widening
- 146 Resurface and Drainage Improvements
- 147 Resurface and Curb And Gutter
- 148 Hot Mix Asphalt Recycling

Restoration and Rehabilitation

- 150 Recycling Existing Concrete Pavement
- 151 Hot Mix Asphalt Shoulders
- 152 Drainage Correction, Culvert Correction
- 153 Pumphouse Reconstruction/ Placement
- 154 Superelevation Correction
- 155 Cracking and Surfacing Over Old Pavement
- 156 Concrete Overlay
- 157 Pavement Patching
- 158 Longitudinal and Transverse Joint Repairs
- 159 Miscellaneous Rehabilitation (Ramps)

Reconstruction

- 160 Reconstruct Existing, No Widening, Including Interchanges
- 161 Reconstruct for Sight Distance
- 162 Interchange Reconstruction Only